Jet Propulsion Laboratory
California Institute of Technology

Mars 2020 Project

Planetary Protection Topics for Landing Site Selection

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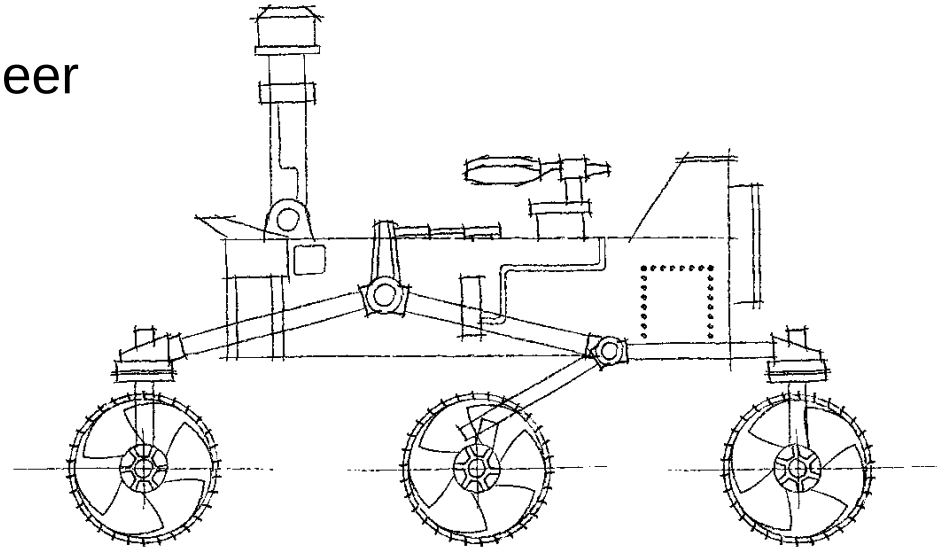


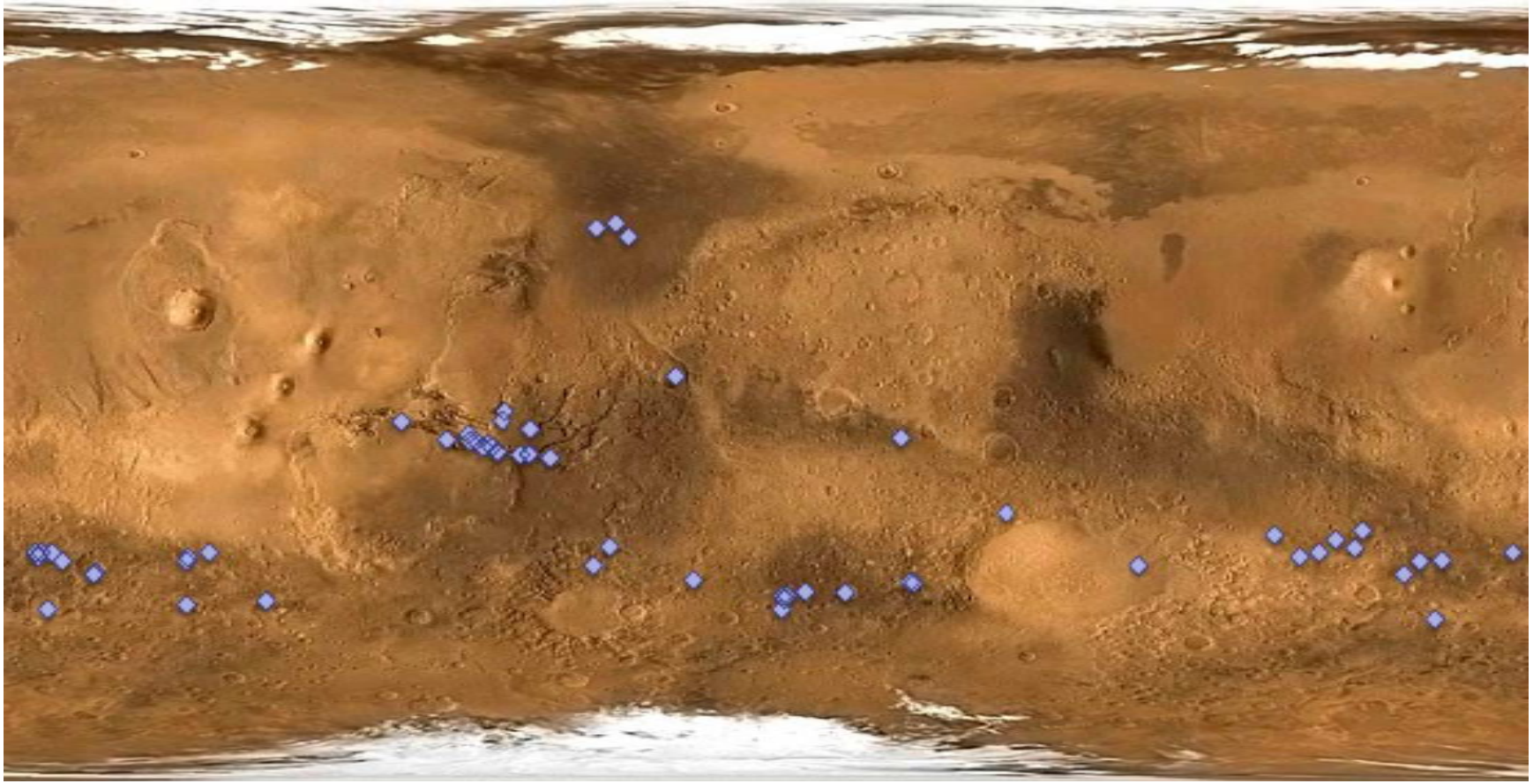
Mars 2020 Project

M2020 Level 2 PP Requirements

#	Title	Statement	Applicability
L2-PP-15	Naturally Occurring Special Regions	The M2020 Project 3-sigma landing ellipse shall avoid all formally defined naturally occurring special regions as well as any region where ice has been observed or is credibly predicted within 5 m of the surface.	Site selection landing ellipse constraint
L2-PP-17	Special Region Avoidance after Landing	The M2020 surface operations shall not access formally defined naturally occurring special regions or any region where ice has been observed or is credibly predicted within 5 m of the surface through post-landing mobility.	Post-landing operations constraint, excludes driving to region of interest in special region
L2-PP-16 (in work)	Anomalous landing, hydrated minerals, and Induced Special Regions	[The M2020 Project shall analyze the probability, extent, and lifetime of induced special regions created by anomalous landing events bringing RTG components in contact with hydrated minerals within the 3-sigma landing ellipse to assure that they would not mobilize a 50 nm particle to a subsurface special region, induced or natural.]	Program/Project-level analysis expected to apply to all landing sites. Not to be used as a discriminator for downselecting at this workshop.

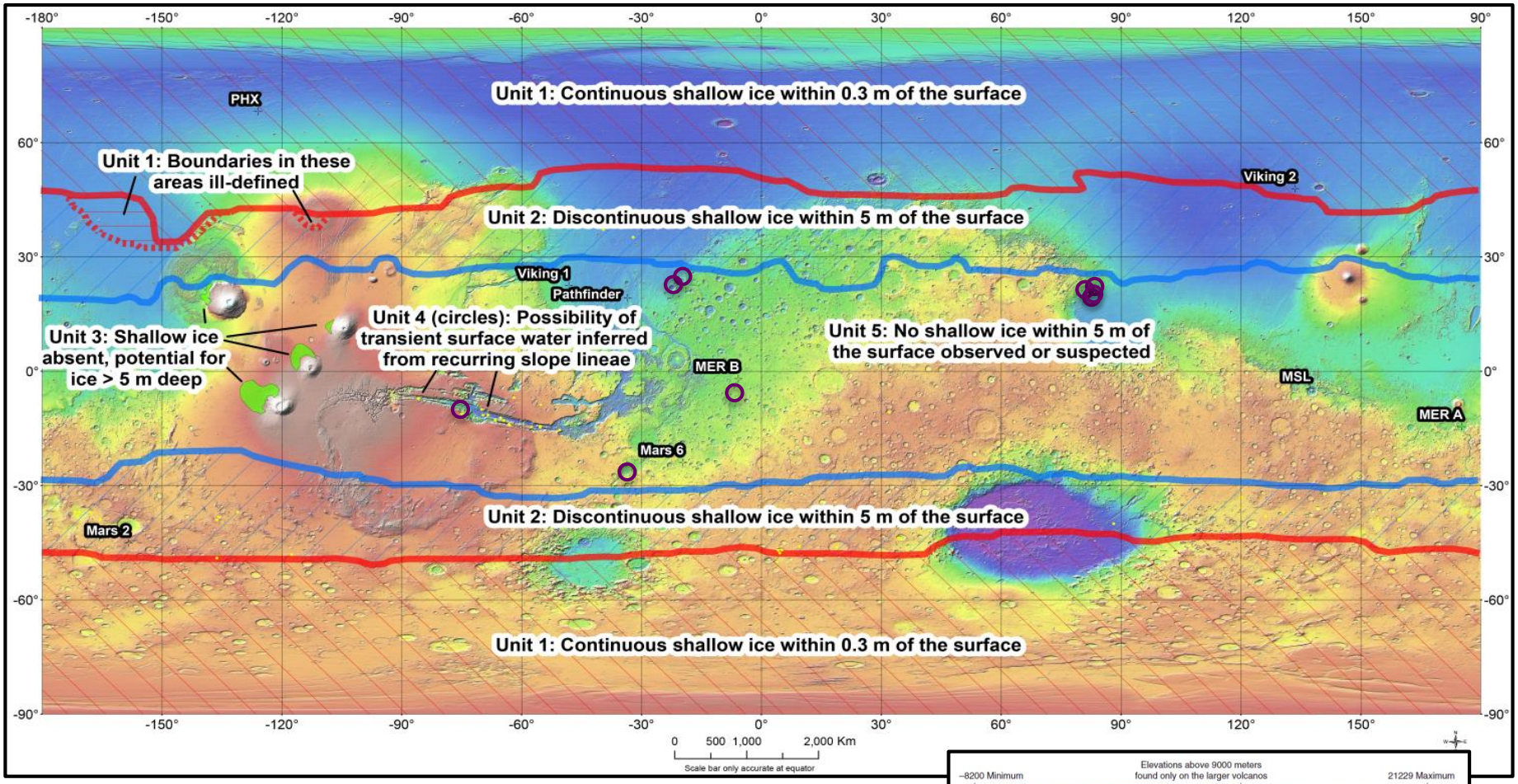
Recurring Slope Lineae: Uncertain Regions – to be treated as Special Regions

- Global Map of fully and partially confirmed RSL sites documented by end of 2013. Simple Cylindrical Map Projection



From Rummel, J. D., et al., "A New Analysis of Mars "Special Regions": Findings of the Second MEPAG Special Regions Science Analysis Group (SR-SAG2), Astrobiology, Volume 14, Number 11, November 2014.

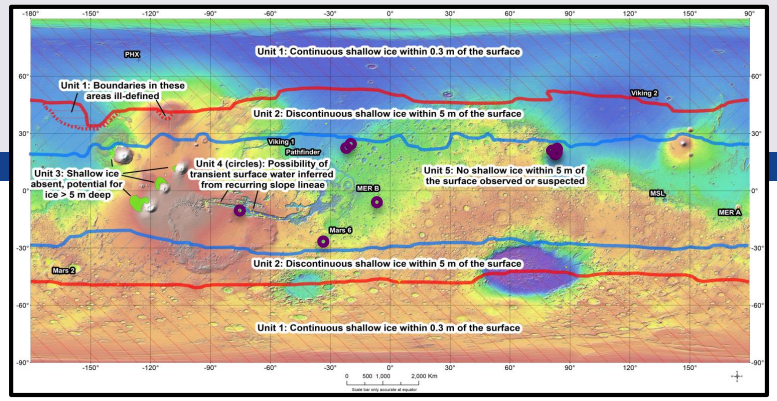
Preliminary Map of Features of Relevance to Interpreting Special Regions on Mars



Indicates location of one of the top 9 ranked sites from the 2014 LSW (oversized circle for visibility)

From Rummel, J. D., et al., "A New Analysis of Mars "Special Regions": Findings of the Second MEPAG Special Regions Science Analysis Group (SR-SAG2), Astrobiology, Volume 14, Number 11, November 2014.

Discussion



- Sites between the blue lines clearly meet the “no ice within 5 m of the surface” requirement
- Sites between the blue and red lines may be acceptable, but must be evaluated on a case by case basis
- Small yellow dots show potential special regions that need to be avoided based on current knowledge, see purple diamonds on RSL figure for better view of these.
- The potential to create or access special regions after an off-nominal impact of the RTG into hydrated minerals is still under investigation.
- Note all current top 9 sites appear to avoid currently known or suspected special regions
  - In future years, the remaining top landing sites will be examined carefully to assure compliance